

MA 3046 - Matrix Analysis

Programming Project and Laboratory Grading Policies

This course includes both graded programming projects and laboratories. The projects involve a combination of theory, basic MATLAB programming, and applications like those you may routinely encounter in follow-on courses or as part of thesis research. Both the projects and laboratories may also illustrate important links between theory and practice in matrix computing. These projects and laboratories are integral to the course, and a course grade of **Incomplete** will be given until **all** have been completed.

I expect gradable work to reflect primarily individual, not group efforts. Verbatim copying from another is, of course, totally unacceptable. However, I also encourage reasonably open discussion of general aspects or specific “sticking points” of these assignments, since that usually aids everyone’s learning. So, until proven wrong, I will trust you to exercise sensible judgment and only turn in any work that:

- Is substantially your own.
- You can explain in more detail, if required.
- Acknowledges, if appropriate, significant assistance provided by others.

Submitted programming projects should be turned in as a brief summary report (**two to four** written pages, plus at most two pages of principal tables and/or graphs), with supplementary graphs, copies of all user-written program listings, MATLAB diary files, etc., as appendices. The summary report should be organized as follows:

- **Introduction and Background** - A *brief* description of the general problem and relevant mathematical (matrix) equations.
- **Numerical Considerations** - A *brief* discussion of the specific algorithms or routines used in the project and the principal sources of error, if any, expected with each of them, plus any specific features of MATLAB exploited.
- **Results and Analysis** - A concise presentation of the results of the computations, along with a reasonably succinct, but complete, discussion and analysis of these results. The discussion should address appropriate measures of performance (such as the actual errors), and the dependence, if any, of these measures on specific problem or algorithm attributes.
- **Lessons Learned** - A critical evaluation of whether the software performed as predicted by the relevant theory, and of the principal matrix computation lessons you feel you learned through this problem.

(Note that not all of the above considerations will necessarily apply to every project, but most of them will apply to most of the projects.) In addition, I would like you to e-mail me copies of **all** m-files (scripts and functions) that you wrote as part of the project.

While you must complete all of the laboratories, not all must be turned in or will be graded. You will be told at the start of each laboratory whether or not that laboratory

must be turned in. Required laboratories should be turned in on the worksheets provided, along with copies of any relevant MATLAB diaries or graphs, Maple work sheets, etc. (Handwritten laboratory worksheets are *fully acceptable*, as are worksheets with relevant MATLAB output "cut and pasted" in.) For ungraded laboratories, you should simply retain your completed worksheets.

In general, my major concern in grading these assignments will be whether or not your *programs run correctly* and *reasonably efficiently*, and whether or not you *adequately address* the relevant theoretical and practical issues raised during the lectures. *Matters of "style" will generally be secondary.* For example, equations, table headings, graph labels, etc., may be added in pen and ink. I generally consider a grade of **B+** appropriate for work that is essentially correct, other than for minor errors, but otherwise unexceptional. An **A** or higher normally indicates work that is not only correct, but also is especially efficient or well documented, contains unusually clear outputs, includes especially insightful analysis, etc. *Very little credit will be given for work that contains either actual or potential serious program or logic errors, no matter how "pretty" the results.* In addition, **B+** is the highest grade that will be given to assignments handed in more than two days late, unless prior permission has been obtained.

When you prepare graded projects or laboratories, you should be aware that among the aspects that I generally appreciate are:

- The use of clear and correct English.
- Computer codes and output in an easily readable font, e.g. normal typewriter size letters.
- Printed output that clearly identifies what the displayed numbers are. (Pen and ink labels or comments are just fine! Again, **don't waste time trying to make output look overly "pretty."** I'm primarily interested in substance.)
- Graphs and tables that are numbered, and referred to by those numbers in the text.
- Numerical tables that do **not** contain more significant digits than you can reasonably expect to be accurate.
- Graphs that are adequately labeled (pen and ink is fine) and adequately "capture" the essence of the observed behavior!
- Discussion and analyses of all error messages generated during your program. (Many of these are often just "courtesy" warnings, but some mean your answers aren't worth the paper they're printed on! You've got to know which is which!)
- Substantiation (i.e. computations, graphs or tables) of all claims of specific behavior, e.g. proportionalities.

Lastly, while I expect you to learn from these projects and laboratories, I don't intend that they become "time sinks." Therefore, if at any point you've spent more than 15-20 minutes on any aspect of one of these, and are *totally* lost, I strongly suggest you ask someone else in the class, or me, for pointers as to how to get back on track.